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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/380,864	12/02/1999	MARTYN VINCENT TWIGG	JMYT-V00200	3166

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RATNERPRESTIA
P O BOX 980
VALLEY FORGE, PA 19482-0980

EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 02/07/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/380,864

Applicant(s)

TWIGG, MARTYN VINCENT

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on November 29, 2002 has been received and carefully considered. The declaration under 37 CFR 1.132 filed November 29, 2002 is sufficient to overcome the rejections based upon Schlatter et al. and Chen et al. in the last Office Action. Claims 1-8 have been cancelled. Claims 9-33 have been added. Claims 9-33 remain active.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 9-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 9-20, the recitation of "A lean burn engine comprising ..." and "An engine..." in the preamble is incomplete and non-functional, since the claims lack the recitation of an element for performing the specific function of the engine, and the scope of the claims is generally directed towards an emission control system for an engine. It is unclear as to whether the applicants are attempting to claim both an engine and emission control system. Furthermore, "the platinum lean NOx catalyst" (claim 19) and "the engine" (claim 20) lack proper positive antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 9, 12-14, 16, 20-21, 24-26 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Addiego et al. (EP 0 514 591).

With respect to claim 9, 14, 21 and 26, Addiego et al. disclose a system and process comprising: (a) a NO_x catalyst comprising platinum (first stage; page 6, lines 52-55); and (b) an oxidation catalyst comprising a platinum group metal PGM, such as platinum and/or palladium (second stage; page 7, lines 53-56); wherein the NO_x catalyst is disposed upstream of the oxidation catalyst (Abstract, lines 2-4; page 6, lines 17-25), such that exhaust gas from an engine is passed over the NO_x catalyst and product gases exiting from the NO_x catalyst are passed over the oxidation catalyst; and wherein the platinum is present in the NO_x catalyst at a loading of less than or equal to 30 g/ft³ (i.e. the total amount of noble metals is about 20 g/ft³ to about 40 g/ft³ for the total substrate; page 6, lines 26-27). Addiego et al. further disclose the system is capable of efficiently converting exhaust gas when the air-to-fuel ratio is lean, i.e. having a redox ratio of 0.8, which may be produced by a lean burn engine (page 4, lines 35-46).

With respect to claims 12 and 24, Addiego et al. further disclose the NO_x catalyst may further comprise an alkaline earth metal, depending on the intended substrate (i.e. magnesium; page 5, lines 40-43).

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With respect to claims 13 and 25, Addiego et al. disclose the oxidation catalyst may comprise a substrate essentially the same as that described for the first stage (page 8, line 2), and the substrate may further comprise a base metal (i.e. copper, iron, nickel; page 5, lines 40-43).

With respect to claim 16 and 28, Addiego et al. further disclose the oxidation catalyst or the NOx catalyst may further comprise alumina, a zeolite, ceria or zirconia (page 5, lines 27-44; page 6, lines 2-13).

With respect to claim 20, Addiego et al. further disclose the engine for generating exhaust gas may comprise a lean burn engine, depending on the intended use (page 4, lines 42-46).

Instant claims 9, 12-14, 16, 20-21, 24-26, 28 read on the system and process of Addiego et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. Claims 10-11 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Addiego et al. (EP 0 514 591).

Addiego et al. are expressly silent as to whether the NOx catalyst has an activity sufficient to provide a ratio of % NOx conversion to % hydrocarbon conversion of at least 0.2, or

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whether the oxidation catalyst has an activity sufficient to provide a % hydrocarbon conversion of greater than 80% and a % carbon monoxide conversion of greater than 70%, as measured the testing condition of a temperature of 230 °C, a space velocity of 25,000 hr-1 and a hydrocarbon:NOx input ratio of 3:1 counting the hydrocarbon as equivalent propane. In any event, the system and method of Addiego meet the claims, since although the specific percent conversion ratio and percent conversions are not expressly stated for the given testing conditions, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 195 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). The catalyst system disclosed by Addiego et al. comprises substantially the elements of the instantly claimed invention and therefore one of ordinary skill in the art would not expect a different and/or unexpected result to be obtained. Also, although the specific testing conditions as instantly claimed are not specifically disclosed in the Addiego et al. reference, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio on the basis of suitability for the intended use since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

5. Claims 15 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Addiego et al. (EP 0 514 591) in view of Voss et al. (U.S. 5,491,120).

Addiego et al. further disclose the major portion of the platinum and/or palladium in the entire system is present in the second stage (page 7, lines 56-57), and therefore the PGM loading for the oxidation catalyst is larger than the platinum loading for the lean NOx catalyst. However,

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Addiego et al. is silent as to whether the oxidation catalyst may comprise a specific PGM loading of about 100 g/ft³. Voss et al. teach an oxidation catalyst composition, suitable for oxidizing hydrocarbons and carbon monoxide from diesel engine exhaust, comprising a conventional loading of 0.1 to 200 g/ft³ of a PGM, namely palladium. More preferably, the amount is from 20 to 120 g/ft³ (column 6, line 65 to column 7, line 20; column 9, lines 13-31). It would have been obvious for one of ordinary skill in the art at the time the invention was made to select a PGM (palladium) loading of about 100 g/ft³ for the oxidation catalyst in the system and process of Addiego et al. because the catalyst loading, within the range as taught by Voss et al., promotes oxidation of CO and HC gaseous components while reducing the undesirable oxidation of SO₂ to SO₃, which contributes to the formation of unwanted particulates (i.e. soot) in diesel exhaust streams, as taught by Voss et al. (column 6, lines 2-8).

6. Claims 17 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Addiego et al. (EP 0 514 591) in view of Chen et al. (U.S. 5,451,388).

Addiego et al. are silent as to whether the volume of the substrate coated with the NO_x catalyst is at least 150% that of the oxidation catalyst. Chen et al. teach that in dual bed configurations, the relative bed volume of the first and second catalyst beds may be varied according to the specific conversion requirements of the treatment application. In particular, Chen et al. cite an example wherein the volume of the first catalyst bed may be larger than the volume of the second catalyst bed, in order to affect the conversion selectivity for a particular gas component (column 13, lines 20-40). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the volume of the catalyst beds in the system and process of Addiego such that the NO_x catalyst substrate was larger than the volume

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of the oxidation catalyst substrate, since adjustment of bed volume allows the catalytic components to be specifically sized and tailored to a particular application, i.e. for achieving a particular conversion efficiency for a specific exhaust component, as taught by Chen et al.

Although a 150% volume increase of the lean NO_x substrate is not specifically taught, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made select a bed volume as such, on the basis of suitability for intended use and absent showing unexpected results, since changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955).

7. Claims 18 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Addiego et al. (EP 0 514 591) in view of Fukui et al. (U.S. 5,474,745).

Addiego et al. are silent as to the NO_x catalyst being coated on two catalyst substrates arranged in parallel. Fukui et al. teach an apparatus for reducing NO_x in exhaust gas from a diesel engine comprising NO_x reducing catalyst coated on two catalyst substrates arranged in parallel (FIG. 15; column 11, lines 34-44). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the system and process of Addiego et al. such that the NO_x catalyst was coated on two catalyst substrates arranged in parallel, because such arrangement improves the heat release ability [of the substrate] compared with a larger converter, as taught by Fukui et al. As Fukui et al. cite, "In order to increase the conversion efficiency for reducing NO_x in the exhaust gas... it is important to keep temperatures of the gas and catalyst from increasing by releasing the exothermic heat to the outside immediately," (column 4, lines 3-11).

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8. Claims 19 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over Addiego et al. (EP 0 514 591) in view of Abe et al. (EP 0 661 089).

Addiego et al. further disclose means for injecting reducing agents (such as hydrocarbon components) into the exhaust upstream of the NOx catalyst (page 4, lines 35-44), but are silent as to whether the reducing agents are injected into the exhaust gas upstream of the NOx catalyst. Abe et al. teach process for reducing NOx in the exhaust gas of a lean air-to-fuel ratio wherein at least one reducing agent of hydrocarbons and oxygen-containing organic compounds having at least two carbon atoms or a fuel containing at least one of the reducing agents is introduced on an upstream side of the exhaust gas cleaner (page 3, lines 12-21). It would have been obvious for one of ordinary skill in the art at the time the invention was made to inject the reducing agents or hydrocarbon fuel upstream of the NOx catalyst in the system and process of Addiego et al. because “the exhaust gas generally does not contain sufficient amounts of residual hydrocarbons to reduce all nitrogen oxides in the exhaust gas,” as taught by Abe et al. (page 6, lines 39-44).

9. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Addiego et al. (EP 0 514 591) in view of Oliver (U.S. 3,915,896).

Addiego et al. disclose a space velocity of $50,000 \text{ hr}^{-1}$ for the enclosed test system (page 8, lines 32-34). However, Addiego et al. are silent as to specifically a space velocity of below $40,000 \text{ hr}^{-1}$ for the NOx catalyst system, and a space velocity of $40,000 - 80,000 \text{ hr}^{-1}$ for the oxidation catalyst. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to adjust the gas space velocity in the process of Addiego et al. to lie between the specifically claimed values on the basis of suitability for intended use, since it has been held that where the general conditions of a claim are disclosed

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in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, Oliver teaches that the space velocity of a process is typically in the range of 10,000 to 300,000 hr⁻¹ for separate reduction or oxidation or combined reduction and oxidation beds, reflective of the range of space velocities generated by an engine driving a vehicle in town conditions (column 7, lines 1-20). The instantly claimed space velocities would be inherent, depending on the engine and specific driving conditions.

Response to Arguments

10. Applicant's arguments with respect to claims 9-33 have been considered but are now moot in view of the new grounds of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951.

The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung
February 4, 2003 JAL

Hien Tran
**HIEN TRAN
PRIMARY EXAMINER**